Squeezing silica reveals meteorite secrets

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Scientists at Los Alamos National Laboratory are gaining insights into one of the effects of meteorite collisions with earth. Arianna Gleason, Cindy Bolme and Richard Sandberg used lasers in the ultraviolet region to generate shock waves in a common form of silica that is one of the most abundant components of the earth's crust. The experiments performed at the SLAC National Accelerator Laboratory revealed that the heat and compression from the shock wave resulted in a very fast transformation into stishovite. Stishovite is a very dense and hard crystal that is found at meteorite craters as well as deep in the earth's mantle.

One revelation of the work was how fast the change occurred. They were able to measure the change that took place in only a few billionths of a second. Prior to this work, the transition was thought to occur tens or hundreds of times slower. The atoms rearrange themselves to form tiny crystals of the stishovite. This work could ultimately generate new models of planetary formation. Insights into material science could

also lead to materials with superior functionality and strength. This work was recently published in Nature Communications.

At the time this work was done, Arianna Gleason was a post-doc at SLAC co-mentored by Cindy Bolme and Stanford Professor Wendy Mao. Arianna Gleason is now a Reines Postdoctoral Fellow at LANL.